

**Amendments to the Claims:**

This listing of claims will replace all prior versions, and listings, of claims in the application:

**Listing of Claims:**

1-6. (Cancelled)

7. (Currently Amended) A renal replacement therapy system, comprising: a blood circuit and a non blood fluid circuit, actuators, and a filter, the blood fluid circuit including [[:]] an arterial blood line connectable to a patient access and adapted to convey blood from said patient access to the filter; a venous blood line connectable to said patient access and adapted to convey blood from said filter to the patient access; and a pump configured to convey blood through said arterial blood line, a sensor to sense pressure in said arterial blood line located upstream of the pump and downstream of the patient access, and a controller connected to receive a pressure signal from said sensor and to control a rate of flow of said pump; said controller being configured to maintain a constant pressure in said arterial blood line by regulating a speed of said pump in response to said pressure signal, wherein the filter is connected directly to the pump such that the speed of the pump determines a pressure on a blood side of the filter; the controller and the blood fluid circuit being further configured to pump blood such that blood is drawn through the arterial line and simultaneously pumped through the venous line continuously during a treatment, whereby a continuous flow of blood to and from a patient is provided.

8. (Original) A system as in claim 7, wherein said controller is configured to slow said rate of flow when said pressure drops.

9. (Original) A system as in claim 8, wherein said controller is configured to speed up said rate of flow when said pressure increases.

10. (Canceled).

11. (Previously Presented) A system as in claim 7, wherein said controller is configured to compare said pressure signal with a predetermined value.

12. (Previously Presented) A system as in claim 7, wherein said controller is configured such that when said patient access becomes clogged, said rate of flow is slowed.

13. (Currently Amended) A renal replacement therapy system, comprising: a blood circuit and a non blood fluid circuit, actuators, and a filter, the blood fluid circuit including [[:]] an arterial blood line connectable to a patient access and adapted to convey blood from said patient access to a filter; a venous blood line connectable to said patient access and adapted to convey blood from said filter to said patient access; and a pump configured to convey blood through said arterial blood line, a sensor to sense pressure in said arterial blood line, and a controller connected to receive a pressure signal from said sensor and to control a non-zero rate of flow of said pump between multiple different flow rates such that a constant pressure is maintained, during pumping, in said arterial

blood line by regulating a speed of said pump in response to said pressure signal, wherein the filter is connected directly to the pump such that the speed of the pump determines a pressure on a blood side of the filter; the controller and the blood fluid circuit being further configured to pump blood such that blood is drawn through the arterial line and simultaneously pumped through the venous line continuously during a treatment, whereby a continuous flow of blood to and from a patient is provided.

14. (Previously Presented) A system as in claim 13, wherein said controller is configured to slow said rate of flow when said pressure drops.

15. (Previously Presented) A system as in claim 14, wherein said controller is configured to speed up said rate of flow when said pressure increases.

16. (Previously Presented) A system as in claim 13, wherein said controller is configured to compare said pressure signal with a predetermined value.

17. (Previously Presented) A system as in claim 13, wherein said controller is configured such that, when resistance to flow in the arterial blood line increases, said rate of flow is slowed.

18. (New) A system as in claim 7, further comprising a waste line, a waste pump configured to pump waste from the filter, a waste pump controller configured to control the waste pump, and a waste pressure sensor, the waste pump controller being configured

to regulate a pressure on a waste side of the filter at a predetermined level by regulating the waste pump.

19. (New) A system as in claim 13, further comprising a waste line, a waste pump configured to pump waste from the filter, a waste pump controller configured to control the waste pump, and a waste pressure sensor, the waste pump controller being configured to regulate a pressure on a waste side of the filter at a predetermined level by regulating the waste pump.